

IN THE CLAIMS

1. (currently amended) An image rendering apparatus, comprising:

extracting means for determining that a given line part of an object depicted in a three-dimensional image is a visually important line part, the visually important line part being a contour line of the depicted object or a contour candidate line of the depicted object, and for extracting only data representing the visually important line part from data representing the three-dimensional image;

image rendering means for rendering the three-dimensional image to generate respective pluralities of first ~~pixel~~-values for each pixel in the three-dimensional image ~~so that~~ whereby a given one of the pluralities of first ~~pixel~~ values is associated with a specific one of the pixels in the three-dimensional image, the rendered image including a portion in which aliasing occurs;

antialiasing means for antialiasing only the extracted data to form an antialiased image portion associated with the visually important line part by generating respective pluralities of second ~~pixel~~-values for each pixel in the visually important line part ~~so that~~ whereby a given one of the pluralities of second ~~pixel~~-values is associated with a specific one of the pixels in the visually important line part; and

overwriting means for overwriting by using the pluralities of second ~~pixel~~-values associated with each pixel of the visually important line part to replace the pluralities of first ~~pixel~~-values associated with each pixel of the visually important line part thereby at least reducing the aliasing of the portion of the rendered image.

2. (cancelled)

3. (previously presented) An image rendering apparatus according to claim 1, wherein said image rendering

means renders the three-dimensional image using polygon data that represents the three-dimensional image, and said extracting means extracts only the data representing the visually important line part by extracting corresponding data from the polygon data, the corresponding data being selected from the group consisting of line data, curve data and line strip data.

4. (previously presented) An image rendering apparatus according to claim 1, wherein the visually important line part passes through a plurality of pixels, and said antialiasing means generates pixel values for each of the plurality of pixels as a function of an occupancy value of that pixel, the occupancy value of a respective pixel being based on a ratio of an area of an occupied portion of the pixel to an area of the pixel, the area of the occupied portion of the pixel being based on an area occupied by a portion of the visually important line part that passes through the pixel when the visually important line part is a straight line or being based on an area occupied by an ideal straight line segment which approximates the portion of the visually important line part when the visually important line part is curved.

5. (previously presented) An image rendering apparatus according to claim 4, wherein the portion of the visually important line part or the ideal straight line segment forms an angle with an X-axis, and said antialiasing means antialiases a range of pixels along the X-axis when the angle is equal to or larger than a predetermined value and antialiases a range of pixels along a Y-axis that is orthogonal to the X-axis when the angle is smaller than the predetermined value.

6. (previously presented) An image rendering apparatus according to claim 4, wherein each of the plurality of pixels is divided into a matrix of sub-pixels, and said antialiasing means determines the area of the occupied portion of the pixel in units of sub-pixel areas.

7. (currently amended) An image rendering method, comprising:

determining that a given line part of an object depicted in a three-dimensional image is a visually important line part, the visually important line part being a contour line of the depicted object or a contour candidate line of the depicted object;

extracting only data representing the visually important line part from data representing the three-dimensional image;

rendering the three-dimensional image to generate respective pluralities of first ~~pixel~~-values for each pixel in the three-dimensional image ~~so that~~ whereby a given one of the pluralities of first ~~pixel~~-values is associated with a specific one of the pixels in the three-dimensional image, the rendered image including a portion in which aliasing occurs;

antialiasing only the extracted data to generate respective pluralities of second ~~pixel~~-values for each pixel in the visually important line part ~~so that~~ whereby a given one of the pluralities of second ~~pixel~~-values is associated with a specific one of the pixels in the visually important line part; and

overwriting by using the pluralities of second ~~pixel~~-values associated with each pixel of the visually important line part to replace the pluralities of first ~~pixel~~-values associated with each pixel of the visually important line part thereby at least reducing the aliasing of the portion of the rendered image.

8. (cancelled)

9. (previously presented) An image rendering method according to claim 7, wherein said step of rendering an image includes rendering the three-dimensional image using polygon data that represents the three-dimensional image, and

said step of extracting only the data representing the visually important line part includes extracting corresponding data from the polygon data, the corresponding data being selected from the group consisting of line data, curve data and line strip data.

10. (previously presented) An image rendering method according to claim 7, wherein the visually important line part passes through a plurality of pixels, and said step of forming the antialiased image portion includes generating pixel values for each of the plurality of pixels as a function of an occupancy value of that pixel, the occupancy value of a respective pixel being based on a ratio of an area of an occupied portion of the pixel to an area of the pixel, the area of the occupied portion of the pixel being based on an area occupied by a portion of the visually important line part that passes through the pixel when the visually important line part is a straight line or being based on an area occupied by an ideal straight line segment which approximates the portion of the visually important line part when the visually important line part is curved.

11. (previously presented) An image rendering method according to claim 10, wherein the portion of the visually important line part or the ideal straight line segment forms an angle with an X-axis, and said step of forming the antialiased image portion includes antialiasing a range of pixels along the X-axis when the angle is equal to or larger than a predetermined value and antialiasing a range of pixels along a Y-axis that is orthogonal to the X-axis when the angle is smaller than the predetermined value.

12. (previously presented) An image rendering method according to claim 10, wherein each of the plurality of pixels is divided into a matrix of sub-pixels, and said step of forming the antialiased image portion includes determining the

area of the occupied portion of the pixel in units of sub-pixel areas.

13. (currently amended) A computer-readable storage medium having a computer program stored therein for operating an apparatus to perform an image rendering method, said method comprising:

determining that a given line part of an object depicted in a three-dimensional image is a visually important line part, the visually important line part being a contour line of the depicted object or a contour candidate line of the depicted object;

extracting only data representing the visually important line part from data representing the three-dimensional image;

rendering the three-dimensional image to generate respective pluralities of first ~~pixel~~-values for each pixel in the three-dimensional image ~~so that~~ whereby a given one of the pluralities of first ~~pixel~~-values is associated with a specific one of the pixels in the three-dimensional image, the rendered image including a portion in which aliasing occurs;

antialiasing only the extracted data to generate respective pluralities of second ~~pixel~~-values for each pixel in the visually important line part ~~so that~~ whereby a given one of the pluralities of second ~~pixel~~-values is associated with a specific one of the pixels in the visually important line part; and

overwriting by using the pluralities of second ~~pixel~~-values associated with each pixel of the visually important line part to replace the pluralities of first ~~pixel~~-values associated with each pixel of the visually important line part thereby at least reducing the aliasing of the portion of the rendered image.

14. (cancelled)

15. (previously presented) A storage medium according to claim 13, wherein said step of rendering an image includes rendering the three-dimensional image using polygon data that represents the three-dimensional image, and said step of extracting only the data representing the visually important line part includes extracting corresponding data from the polygon data, the corresponding data being selected from the group consisting of line data, curve data and line strip data.

16. (previously presented) A storage medium according to claim 13, wherein the visually important line part passes through a plurality of pixels, and said step of forming the antialiased image portion includes generating pixel values for each of the plurality of pixels as a function of an occupancy value of that pixel, the occupancy value of a respective pixel being based on a ratio of an area of an occupied portion of the pixel to an area of the pixel, the area of the occupied portion of the pixel being based on an area occupied by a portion of the visually important line part that passes through the pixel when the visually important line part is a straight line or being based on an area occupied by an ideal straight line segment which approximates the portion of the visually important line part when the visually important line part is curved.

17. (previously presented) A storage medium according to claim 16, wherein the portion of the visually important line part or the ideal straight line segment forms an angle with an X-axis, and said step of forming the antialiased image portion includes antialiasing a range of pixels along the X-axis when the angle is equal to or larger than a predetermined value and antialiasing a range of pixels along a Y-axis that is orthogonal to the X-axis when the angle is smaller than the predetermined value.

18. (previously presented) A storage medium according to claim 16, wherein each of the plurality of pixels is divided into a matrix of sub-pixels, and said step of forming the antialiased image portion includes determining the area of the occupied portion of the pixel in units of sub-pixel areas.

19. (currently amended) A server apparatus, comprising:

a computer-readable storage medium for storing a computer program for operating an apparatus to perform an image rendering method; and

distributing means for distributing the computer program stored on the computer-readable storage medium;

wherein the method includes:

determining that a given line part of an object depicted in a three-dimensional image is a visually important line part, the visually important line part being a contour line of the depicted object or a contour candidate line of the depicted object;

extracting only data representing the visually important line part from data representing the three-dimensional image;

rendering the three-dimensional image to generate respective pluralities of first ~~pixel~~-values for each pixel in the three-dimensional image ~~so that~~ whereby a given one of the pluralities of first ~~pixel~~-values is associated with a specific one of the pixels in the three-dimensional image, the rendered image including a portion in which aliasing occurs;

antialiasing only the extracted data to generate respective pluralities of second ~~pixel~~-values for each pixel in the visually important line part ~~so that~~ whereby a given one of the pluralities of second ~~pixel~~-values is associated with a specific one of the pixels in the visually important line part; and

overwriting by using the pluralities of second ~~pixel~~ values associated with each pixel of the visually important line part to replace the pluralities of first ~~pixel~~-values associated with each pixel of the visually important line part thereby at least reducing the aliasing of the portion of the rendered image.

20. (currently amended) A computer-readable storage medium having a computer program stored therein for operating an apparatus to perform an image rendering method, said method comprising:

determining that a given line part of an object depicted in a three-dimensional image is a visually important line part, the visually important line part being a contour line of the depicted object or a contour candidate line of the depicted object;

extracting a portion of data from data representing the three-dimensional image, the portion of data representing only the visually important line part;

rendering the three-dimensional image to generate respective pluralities of first ~~pixel~~-values for each pixel in the three-dimensional image ~~so that~~ whereby a given one of the pluralities of first ~~pixel~~-values is associated with a specific one of the pixels in the three-dimensional image, the rendered image including a portion in which aliasing occurs;

antialiasing only the extracted data to generate respective pluralities of second ~~pixel~~-values for each pixel in the visually important line part ~~so that~~ whereby a given one of the pluralities of second ~~pixel~~-values is associated with a specific one of the pixels in the visually important line part; and

overwriting by using the pluralities of second ~~pixel~~ values associated with each pixel of the visually important line part to replace the pluralities of first ~~pixel~~-values associated

with each pixel of the visually important line part thereby at least reducing the aliasing of the portion of the rendered image.

21. - 32. (cancelled)

33. (currently amended) An image rendering apparatus, comprising:

extracting means for determining that a given line part of an object depicted in a three-dimensional image is a visually important line part, the visually important line part being a contour line of the depicted object or a contour candidate line of the depicted object, and for extracting a portion of data from data representing the three-dimensional image, the portion of data representing only the visually important line part;

rendering means for rendering the three-dimensional image to generate respective pluralities of first ~~pixel~~-values for each pixel in the three-dimensional image ~~so that~~ whereby a given one of the pluralities of first ~~pixel~~-values is associated with a specific one of the pixels in the three-dimensional image, the rendered image including a portion in which aliasing occurs;

antialiased image forming means for generating respective pluralities of second ~~pixel~~-values for each pixel in the visually important line part of the depicted object by antialiasing only the extracted data ~~so that~~ whereby a given one of the pluralities of second ~~pixel~~-values is associated with a specific one of the pixels in the visually important line part; and

overwriting means for overwriting by using the pluralities of second ~~pixel~~-values associated with each pixel of the visually important line part to replace the pluralities of first ~~pixel~~-values associated with each pixel of the visually

important line part thereby at least reducing the aliasing of the portion of the rendered image.

34. - 35. (cancelled)

36. (currently amended) An image rendering method, comprising:

determining that a given line part of an object depicted in a three-dimensional image is a visually important line part, the visually important line part being a contour line of the depicted object or a contour candidate line of the depicted object;

extracting a portion of data from data representing a three-dimensional image, the portion of data representing only the visually important line part;

rendering the three-dimensional image to generate respective pluralities of first ~~pixel~~-values for each pixel in the three-dimensional image ~~so that~~ whereby a given one of the pluralities of first ~~pixel~~-values is associated with a specific one of the pixels in the three-dimensional image, the rendered image including a portion in which aliasing occurs;

generating respective pluralities of second ~~pixel~~ values for each pixel in the visually important line part of the depicted object by antialiasing only the extracted data ~~so that~~ whereby a given one of the pluralities of second ~~pixel~~-values is associated with a specific one of the pixels in the visually important line part; and

overwriting by using the pluralities of second ~~pixel~~ values associated with each pixel of the visually important line part to replace the pluralities of first ~~pixel~~-values associated with each pixel of the visually important line part thereby at least reducing the aliasing of the portion of the rendered image.

37. - 38. (cancelled)

39. (previously presented) A computer-readable storage medium according to claim 20, wherein said step of rendering the image includes rendering the three-dimensional image using polygon data that represents the three-dimensional image, and said step of extracting the portion of data representing only the visually important line part includes extracting corresponding data from the polygon data, the corresponding data being selected from the group consisting of line data, curve data and line strip data.

40. (previously presented) An image rendering apparatus according to claim 33, wherein said rendering means renders the three-dimensional image using polygon data that represents the three-dimensional image, and said extracting means extracts the portion of data representing only the visually important line part by extracting corresponding data from the polygon data, the corresponding data being selected from the group consisting of line data, curve data and line strip data.

41. (previously presented) An image rendering method according to claim 36, wherein said step of rendering the image includes rendering the three-dimensional image using polygon data that represents the three-dimensional image, and said step of extracting the portion of data representing only the visually important line part includes extracting corresponding data from the polygon data, the corresponding data being selected from the group consisting of line data, curve data and line strip data.